Dissipation of turbulence in the solar wind as measured by Cluster

Turbulence in fluids and plasmas is a scale-dependent process that generates fluctuations towards ever-smaller scales until dissipation occurs. Recent Cluster observations in the solar wind demonstrate the existence of a cascade of magnetic energy from the scale of the proton Larmor radius, where kinetic properties of ions invalidate fluid approximations, down to the electron Larmor radius, where electrons become demagnetized. The cascade is quasi-two-dimensional and has been interpreted as consisting of highly oblique kinetic Alfvénic fluctuations that dissipate near at the electron gyroradius scale via proton and electron Landau damping. Here we investigate for the first time the spatial properties of the turbulence at these scales. We report the presence of thin current sheets and discontinuities with spatial sizes $\gtrsim$ the proton Larmor radius. These isolated structures may be manifestations of intermittency, and such would localize sites of turbulent dissipation. Studying the relationship between turbulent dissipation, reconnection and intermittency is crucial for understanding the dynamics of laboratory and astrophysical plasmas.